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RESEARCH PAPER

The effect of a staged, emergency department specific rapid response system on reporting of clinical deterioration

Julie Considine, RN, BN, EmergCert, GDipNurs (AcuteCare), GCertHigherEd, MN, PhD[a,b,c,*]
Jen Rawet, RN, BN (Hons), CritCareCert, GDipNurs (Emerg), MAdultEd[a]
Judy Currey, RN, BN (Hons), CritCareCert, GCertHigherEd, GCertSc (App Stats), PhD[a,c]

[a] *Deakin University, School of Nursing and Midwifery, 221 Burwood Highway, Burwood, Victoria 3125, Australia*
[b] *Eastern Health — Deakin University Nursing & Midwifery Research Centre, 221 Burwood Highway, Burwood, Victoria 3125, Australia*
[c] *Centre for Quality and Patient Safety Research, Deakin University, 221 Burwood Highway, Burwood, Victoria 3125, Australia*

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Summary
Background: Despite emerging evidence regarding clinical deterioration in emergency department (ED) patients, the widespread uptake of rapid response systems (RRS) in EDs has been limited.
Aims: To evaluate the effect of an ED RRS on reporting of clinical deterioration and determine if there were differences between patients who did, and did not, deteriorate during ED care.
Methods: A retrospective cross sectional design was used to conduct this single site study in Melbourne, Australia. Stratified random sampling identified 50 patients with shortness of breath, chest pain or abdominal pain per each year studied (2009—2012) giving a total of 600 patients. The intervention was an ED RRS implemented in stages.
Results: The frequency of clinical deterioration was 14.8% (318 episodes/89 patients). Unreported deterioration decreased each year (86.7%; 68.8%; 55.3%; 54.0%, $p = 0.141$). Patients who

* Corresponding author at: Deakin University, School of Nursing and Midwifery, 221 Burwood Highway, Burwood, Victoria 3125, Australia. Tel.: +61 392446127; fax: +61 392446159.
E-mail addresses: julie.considine@deakin.edu.au (J. Considine), jennifer.rawet@deakin.edu.au (J. Rawet), judy.currey@deakin.edu.au (J. Currey).

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deteriorated during ED care had a longer median ED length of stay (2.8 h; $p < 0.001$), were 31.9% more likely to need hospital admission ($p < 0.001$) and 4.9% more likely to die in hospital ($p = 0.044$).
Conclusions: A staged ED specific RRS decreased the frequency of unreported clinical deterioration. Controlled multi-site studies of ED specific RRSs are needed to examine the effect of formal ED RRSs on patient outcomes.

What is known

- There are few published studies detailing the effect of formal systems for recognising and responding to deteriorating emergency department (ED) patients.
- In Australia, rapid response systems (RRSs) operate in most inpatient units in major health services; however, they do not typically operate in EDs despite clinical deterioration occurring in between 1.5% and 7.5% of ED patients.
- The most common physiological derangements in ED patients that fulfil rapid response system activation criteria are hypotension, tachycardia and tachypnoea.

What this paper adds?

- A multi-faceted approach increased staff reporting of clinical deterioration in ED patients.
- One in six patients had documented evidence of clinical deterioration in the ED, supporting the argument for an ED specific RRS, particularly for patients with systemic presenting complaints.
- The longitudinal nature of the study enables the impact of each separate element of the ED rapid response system as well as the cumulative effect of a multi-faceted intervention to be known.

Background

The majority of patients who suffer in-hospital adverse events with high risk of death (cardiac arrest or unplanned intensive care unit admission) have clearly abnormal physiological signs in the hours before these events and there is a well-documented relationship between abnormal vital signs and mortality.[1–8] Rapid response systems (RRSs) are grounded in the premise that early intervention for deteriorating patients improves patient outcomes and decreases high mortality adverse events such as cardiac arrest and unplanned intensive care unit admission.[9–11] In Australia, RRSs operate in most inpatient wards of major health services; however, they do not typically operate in emergency departments (EDs)[12,13] despite more than 6.7 million emergency department attendances per year.[14] Most EDs in Australia manage clinically unstable patients within their own resources and do not use formal early warning systems. There are a number of major concerns with this approach. First, there is no consistent definition of clinical deterioration. Second, inexperienced staff may be reluctant to report deterioration because of authority gradients or lack of understanding of the significance of physiological abnormalities. Finally, reporting of clinical deterioration by inexperienced nurses to inexperienced medical staff may result in delays to intervention or under treatment.[12]

There are several features unique to the ED context that increase the risk of unrecognised, unreported and/or undertreated clinical deterioration. Patients of varying ages who are usually not known to clinicians attend EDs with undiagnosed and undifferentiated problems, and have a high incidence of nonspecific complaints.[12,15] The ED environment is time pressured with frequent interruptions, prone to uncontrollable workloads, and has high levels of decision density, cognitive load, and decision making under conditions of uncertainty.[12,15] There is an emerging understanding of clinical deterioration in ED patients. Australian data shows that activation of an ED RRS occurs in approximately 1.5% of all ED patients[13] and that 7.5% of patients in general treatment areas (excluding resuscitation, fast-track and mental health) fulfil ED RRS criteria at any point in time.[16] The most common physiological derangements in ED patients that fulfil RRS activation criteria are hypotension, tachycardia and tachypnoea.[13,16] Australian data also shows that unreported clinical deterioration occurs in 12.9% of ED patients and is more common in older patients, during periods of high occupancy and when there is a high proportion of ED patients with low or non-urgent clinical problems.[17] Despite more than two decades of evidence of positive outcomes of RRS for general ward patients,[3,10,18,19] the widespread uptake of RRS in EDs has been limited[12,13] and there are few published studies evaluating the impact of ED specific RRSs.[13]

Aim

The aim of this study is to evaluate the effect of the staged implementation of a RRS on reporting of clinical deterioration in ED patients. A secondary aim was to determine if there were differences between patients who did, and did not, experience clinical deterioration documented during ED care with the view to informing organisational and national strategies for recognising and responding to clinical deterioration in ED patients.

Method

Design

A retrospective cross sectional design was used to undertake this study. The primary outcome measure was unreported clinical deterioration. For the purposes of this paper, unreported clinical deterioration was defined as presence of